ANALYSIS OF CAUSES FOR UNDER-CAPACITY PRODUCTION OF THE ETHIOPIAN RE-BAR MANUFACTURING INDUSTRY

By

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Declarations

I, hereby declare that the work which is being presented in this thesis entitled *Analysis of causes for under-capacity production of the Ethiopian re-bar manufacturing industry was* composed by myself, with the guidance of my advisor, that the work contained here in my own except where explicitly stated otherwise in the text, and that this thesis has not been submitted either in part or in full for any higher education institutions for the purpose of earning any degree.

Solomon Mulugeta Yigletu	_____	_____
Name	Signature	Date

Certificate

This is to certify that the thesis prepared by **Mr. Solomon Mulugeta Yigletu** entitled **"Analysis of causes for under-capacity production of the Ethiopian re-bar manufacturing industry"** and submitted in fulfillment of the requirement for the Degree of Master of Business Administration in industrial management complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

The problem that this study addresses is the under-capacity utilization of Ethiopian re-bar manufacturers. Reinforcement bar producers in Ethiopia are characterized with their under-capacity utilization. They are using below 50% of their installed capacity. The subtlety of the under-capacity utilization problem of the industry is that there are multitudes of potential causes among which one cannot easily put into their order of significance. Hence, the responsible stakeholders among the government, the industry, and the support institutes, wouldn't easily determine their specific role to resolve the problem before knowing which cause is affecting capacity utilization at most, and how that may affect the productivity of the industries.

Therefore, the purpose and motive of this research is to analyze causes of the under-capacity utilization problem; and thus, to put the major causes in their level of significance in terms of their impact upon productivity. The research method is a mix of qualitative and quantitative approaches in which focus group discussion and interviews were made with different actors that participated directly or indirectly in the re-bar manufacturing industry. The participants were directors, engineering department managers; marketing/commercial department managers of Ethiopian re-bar manufacturers, the Metal Industry Development Institute (MIDI), and the Ethiopian Association of Basic Metal and engineering Industries.

The analysis is done using the Likert model to discover the likely causes and the potential remedies of the problem. Accordingly, 72.22% respondents confirm that lack of foreign currency is a major cause for the under-capacity production problem. Similarly, 69.44% respondents replied 'lack of market (effective demand)' as a major cause for the under-capacity production of the industries. Moreover, 63.89% respondents indicate the influence of imported re-bar products as one of major causes. In addition, 63.89% respondents pointed

out that ‘irregularities of rules and regulation of the Public Procurement and Property Disposal Service (PPPDS)’ are major causes for the under-capacity production problem.

Beyond identifying the likely causes of under-capacity production, the reach found the share of responsibilities that the major stakeholders, the government, the industry, the support institutes, and the sector association, are supposed to shoulder in resolving the challenge.

Key words: Re-bar, capacity utilization, Basic metal and engineering sector, productivity, market, foreign currency, stakeholders, government.

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Table of Contents

List of Tables

Acronyms

CAPEX: Capital expenditure

EABMEI: Ethiopian Association of Basic Metals and Engineering Industries

FOREX: Foreign exchange

MCI: Metal Consult International

METEC: Metal and Engineering Corporation

MIDI: Metal Industry Development Institute

MoI: Ministry of Industry

PPPDS: Public Procurement and Property Disposal Service

RE-BAR: Reinforcement bar

SME: Small and Medium Enterprises

CHAPTER ONE *: INTRODUCTION*

1.1. Background of the study

Reinforcement bar, commonly named as 're-bar', is a structural steel element used in the construction process to strengthen the concrete by being a tension structural element. Currently, there are about 10 re-bar manufacturers in Ethiopia of which only five are considered as active in the market. There are also about five manufacturers in the pipe-line of investment to join the market shortly. (MIDI, 2016, p. 3).

The re-bar manufacturers are the major constituents of the Ethiopian basic metal sector. In this sense, it could be said that to refer to re-bar manufacturers is almost referring to the basic metal industry sub-sector in today's Ethiopian context (Samuel, 2017) .

International Standard for Industrial Classification classified metal industry into basic metal and engineering industry (Demoz, 2014, pp. 64-66).

- *Basic Metal Industries* that deal with production of metal from ore, scrap and conversion of billet, slabs etc. into primary metal products such as metal sheet, tubes, bars, wires, cables and nails.
- *Engineering Industries* convert primary metal products into secondary products such as metallic structures, tanks, and pressure vessels, machine parts, machineries, transport equipment, electrical and electronic equipment, measuring and control instruments.

The re-bar companies, which represented the basic metal sector, in the Ethiopian context couldn't attain more than 50% of their respective annual installed production capacities. The under-capacity utilization challenge, in turn, imposes on the industries different inefficiencies (Fitea, 2017).

Capacity utilization is a key indicator in every industry group which not only helps to determine the level of utilization of existing capacity but also helps to define the required level of expansion of the capacity for a targeted output. The broad concept of employed capacity means the maximum possible production with the available equipment during the year, assuming normal operative conditions. The concept of specifying capacity utilization measures the rate of utilization in terms of realized output relative to installed capacity. Full utilization of installed capacity helps to control inflation in the economy and makes the

industrialization process more economical. Basic industry is the one on which manufacturing process of many other industries is dependent. It includes sub industries such as Cement, Steel and Fertilizers (Bhatia & Kaur, 2016, pp. 10-12).

Basic industry groups produce the primary raw materials for the other manufacturers to work and it feeds other heavy machinery industries, infrastructure and housing projects etc. This industry has been developed as having strong industrial base and reducing progressively the dependence on foreign aid. Hence, there is a need to assess capacity utilization in the Basic Goods Industry in order to have deeper insight into the problem of trade deficit in this vital sector.

Peoples from the Ethiopian basic metal industries are raising many issues as responsible factors for the under-capacity utilization in the sector. Whatever the reasons may be, the effect of under-capacity utilization has a harmful impact on the development of the industries; and, it also hinders the Ethiopian industrialization process as a whole. Thus, extensive research projects with the aim of finding solutions for the Ethiopian re-bar sub-sector would be an important endeavor for researchers in the field of industrial engineering and management.

At a glance, knowledgeable people in the metal sector have mentioned various reasons for the under-capacity utilization of Ethiopian re-bar manufacturing. Accordingly, many opinions are forwarded by some experts showing that there is much to be done within the circle of influence of the manufacturers themselves (Fitea, 2017).

In line with this, technology and management related factors, like appropriate planning in machine capacity utilization, economic usage of power and energy, product conformity to the standard, strengthening of supply chain management and leadership, formulation and implementation of appropriate marketing and sales strategy, implementing of modern human resources management schemes, etc., are picked up as lacking areas from the industries' side which may impose their own negative impact in using full industrial potential capacity (Samuel, 2017).

Moreover, the lack of raw materials and inputs, lack of foreign exchange, red-tape in the public procurement processes, lack of well-trained and skilled manpower, etc., are among factors mentioned as responsible causes for the under-capacity problem of the sector which are supposed to be addressed predominantly by governmental interventions.

The industrial development strategy document of Ethiopia clearly states that the huge construction projects across the nation must create sustainable and stable markets for industrial products, like re-bar, cement, and timber products. But, in most cases this target seems to have been missed, which is evidenced with below half of capacity utilization rate of re-bar manufacturing industries with lack of market as one of the major challenges of the industries due to unclear practices in the public procurement processes. While the industries are dreadfully complaining on the public procurement and foreign exchange provisions, still there is a huge amount of same finished product is imported from aboard for public projects, till recently (Belete, 2017).

In assessing relevant literature, the researcher has found no findings in aspect of the possible causes of under-capacity utilization problem of the Ethiopian basic metal sector, except, mentioning the fact that the industries are facing different problems, like power, market, quality, etc. Steel is considered to be crucial to the development of any modern economy and thus, it is the backbone of human civilization. The level of per capita consumption of steel is considered one of the important indicators of socio-economic development and living standards of the people in any given country. On the other hand, technological innovations have provided the competitive edge to the technologically strong companies. Smooth and quick transfer of technology has, however, meant an increasingly competitive pressure on these companies to be technologically superior to their competitors. The Ethiopian economy, however, is characterized by the lowest level of industrialization. Core manufacturing sectors, such as iron and steel, are least developed in many aspects such as, technology employed, production volume, product quality, labor skills, marketing knowledge, meeting delivery time requirement and export capacity. As a result, the developments of other sectors are affected due to the lack of modernization of these fundamental factors (Muzeyin, 2014, pp. 50,54).

The basic metal sector is said to be the mother of all industries. In this sense, the relevance of the research topic on the causes of under-capacity utilization is self-evident in that resolving the capacity utilization problem of the basic metal sector means the profound intervention for the overall growth of Ethiopian industrialization.

Identifying the root causes of the underutilization of the basic metal sector with their seriousness level is essential. As the basic metal sector is mainly considered as infrastructure for the downstream industrial subsector, the under-capacity utilization measurement couldn’t be seen only as a mere arithmetic fact. Its impact is much more than that. The sector is supposed to be a prime mover for the whole industrialization process in such a way that it

builds the very infrastructure for all. On one side, it paves the way for the technology transfer and dissemination, through true practicing of metal manufacturing technology. The country can only take control of its industrialization to the deepest possible level through developing the metal sector (Gatew, 2011).

Background of the Ethiopian manufacturing sector with respect to the basic Metal sub-Sector.

The International Standard for Industrial Classification classified the metal industry into basic metals and the engineering industry.

According to this classification, the industries can be further grouped into four areas: (MCI, 2017, p. 20)

- Manufacture of basic iron and steel,
- Manufacture of fabricated metal products except machinery and equipment,
- Manufacture of machinery and equipment, and
- Manufacture of motor vehicles, trailers & semi-trailers.

The growing electrical and electronics hardware manufacturers also seemed to be considered under the metal and engineering industry sub sector. This is evidenced by the recent support and follows up of the Metal Industry Development Institutes (MIDI) to these industries. The electrical and electronics items manufacturers produce different hardware, like transformers, power factor correctors, electrical meters, television sets, and cell-phone apparatus, etc.

Nevertheless, since their number is estimated to be insignificant comparing with that of the metal industries, and due to lack of clear data on them the above four categories of the sector are preferred as the basis for the estimation of the number of companies in the sector, for this assessment purpose. As per the Ethiopian Central Statistics Authority report, the total number of medium and large establishments in the sector was estimated at 194.

Manufacturing of fabricated metal products (except machinery and equipment) contributes a share of 72.7 percent from total number of establishments in the metal sector whereas the manufacture of basic iron and steel, manufacture of motor vehicles, trailers and semi-trailers and the manufacture of machinery and equipment contribute shares of 20.1, 4.1 and 3.1%, respectively. (CSA, 2012). The number of establishments in the metal and related industry

subsector is shown to grow at an average growth rate of 13.5%. In line with this, currently the number of establishments can be reasonably estimated to reach about 280 (CSA, 2012).

This estimation seems to be in conformance with the data of some major actors in the sector. For example, the Ethiopian Association of Basic Metals and Engineering Industries (which is a national sectorial association and works on the metal sector's development for the benefits of its members) estimated the number of the metal and engineering companies to be 300 (EABMEI, 2015). The Metal Industry Development Institute, a governmental body responsible for the overall development of the sector through firm-level support for the companies in the metal and engineering industry sub-sector, is estimating the number of establishments to be 250 (MIDI, 2016).

Among the basic metal industries in Ethiopia, the reinforcement manufacturing industries are significant ones in terms of their capital investment, economic growth, employment opportunity, and overall infrastructure development role. The basic metal manufacturing industries in Ethiopia are twenty in numbers with a total of about 2.5 million metric ton annual production capacity (MIDI, 2016). This number doesn't include a multitude of small scale workshops operating in metal works and engineering trade, owned by private entrepreneurs or organized either as a group under Small and Medium Enterprises (SME), or as an individual shop owner. (Fitea, 2017).

The reinforcement bar manufacturing companies in Ethiopia are very much growing in number and installed capacity. 25 years ago there was only one factory named Ethiopian Iron and Steel Foundry, which is located at the Akaki-Kality sub-city with a capacity of 12,000 tons per annum; but today there are about 10 factories with a total of more than 2 million ton per annum installed production capacity (Fitea, 2017). However, only 30-40% of this potential production capacity is being utilized.

1.2. Statement of the Problem

The causes of the under-capacity utilization of Ethiopian re-bar manufacturing industries are not yet clearly defined for the concerned bodies to take action in resolving the problem effectively.

Re-bar manufacturers have repeatedly reported performing under-capacity production volume with respect to their installed production capacity.

The re-bar manufacturers, which are basic industries for infrastructure development of the country are using below 50% of their potential capacity. This under-capacity utilization is a problem not only for the industries, but it is also a big challenge against the national industrialization process at large. The complexity of the under-capacity utilization problem of re-bar industries is that there are multitudes of potential causes among which one cannot easily put into their order of significance. In line with this, the responsible stakeholders among the government, the industry owners, and the support institutes, can't easily determine their specific role to resolve the problem before which cause is majorly affecting capacity utilization at most, and how that affects the industry.

1.3. Objectives of the study

1.3.1. General Objective

To analyze the major possible causes for the under-capacity utilization of the Ethiopian Re-bar manufacturing industries, and thus, to define their level of significance so as all the problem may be eased with appropriate intervention of responsible stakeholders.

1.3.2. Specific Objectives

- To identify major causes of under-capacity production of re-bar manufacturers,
- To discover remedial actions to be taken to enhance capacity utilization of re-bar producers,
- To determine the major stakeholder which must take the lead in resolving this problem.

1.4. Basic Research Questions

- What are the major causes for the under-capacity production of re-bar manufacturing?
- How significant is each cause in terms of its severity on the overall capacity utilization of re-bar manufacturing industries?
- What negative economic & social impacts are occurring due to the under-capacity manufacturing of re-bar?

1.5. Significance of the Study

In the month of February 2016, at a meeting held with a higher official of government in the Prime Minister office, the Ethiopian Association of Basic Metals and Engineering Industries

faced a sudden challenge from the chairing minister while the Association tried to reflect the problems of basic metal industries seeking governmental support. The chairing minister was strongly recommending a research on Root Causes for the Under-Capacity Utilization of the Basic Metal Industries so that the government may intervene and deliver appropriate solutions (Samuel, 2017).

The problems and challenges of Ethiopian re-bar manufacturers are heard at different stages by different stakeholders, like the industries themselves, the supporting institutes from the government side, the Metal Industry Development Institute (MIDI), and the national sector association of the manufacturer, the Ethiopian Association for Basic Metals and Engineering Industries and other independent organizations, like the Addis Ababa chamber of commerce.

But, a thorough identification, analysis and the prioritization of different challenges to affect the existing under-capacity utilization problem has not yet occurred, or not officially declared as a thorough research finding.

Thus, it is difficult to intervene with a solution in a systematic way by applying a step-by-step scientific problem-solving methodology. Therefore, the aim of this research is to show the level of significance of the various existing industrial challenges and problems in connection with their impact to under-capacity utilization so that the government as well as the industrialists may take appropriate remedial measures against the problem.

1.6. Scope and Limitation of the Study

The scope of the research is to conduct, review and analyze internal and external under-capacity production challenges of some re-bar manufacturers in Addis Ababa. The research is limited to Ethiopian steel manufacturing companies; specifically reinforcement bar manufacturers and engineering companies in the scope of this study.

1.7. Ethical Consideration of the Research

It is essential to describe ethical standards that should be kept in the process of conducting a research.

Accordingly, these questionnaires and interviews are ethically administered. To this end, the respondents are well informed of the purpose of the research in advance and confirmed in keeping respondent's interview, and questionnaire confidential. Moreover, the intention of the research is to point to the major causes of the under-capacity performance of Ethiopian re-bar manufacturing companies in priority so that the relevant bodies may able to take their respective measures.

1.8. Organization of the study

The study has five chapters. The first chapter deals about the background of the study, statement of the problem, objectives, research question, significance, scope and limitation of the study. The second chapter contains extensive literature review both in theoretical and empirical studies. In the third chapter, the research design and methodology adopted for the study is discussed. The fourth chapter is devoted to the empirical results of the findings of the study and the fifth chapter presents the conclusion of the study and the recommendation forwarded to stakeholders' attention.

CHAPTER TWO *: RELATED LITERATURE REVIEW*

2.1. Historical background of basic metal industry

The development of steel can be traced back 4000 years to the beginning of the Iron Age. Proving to be harder and stronger than bronze, which had previously been the most widely used metal, iron, began to resplace bronze in weaponry and tools. For the following few thousand years, however, the quality of iron produced would depend as much on the ore available as on the production methods.

By the 17th century, iron's properties were well understood, but increasing urbanization in Europe demanded a more versatile structural metal, and by the 19th century, the amount of iron being consumed has increased remarkably by railroads construction (Bell, 2017).

The major breakthrough in steel history came in 1856 when Henry Bessemer developed an effective way to use oxygen to reduce the carbon content in iron. That was the time modern steel industry was born.

By the late 18th century, iron makers learned how to transform cast pig iron into a low-carbon content wrought iron using puddling furnaces (developed by Henry Cort in 1784). The furnaces heated molten iron, which had to be stirred by puddlers using long, oar-shaped tools, allowing oxygen to combine with and slowly remove carbon.

As the carbon content decreases, iron's melting point increases, so masses of iron would agglomerate in the furnace. These masses would be removed and worked with a forge hammer by the puddler before being rolled into sheets or rails. By 1860, there were over 3000 puddling furnaces in Britain, but the process remained hindered by its labor and fuel intensiveness.

The growth of railroads during the 19th century in both Europe and America put great pressure on the iron industry, which still struggled with inefficient production processes.

Yet steel was unproven as a structural metal and production was slow and costly. That was until 1856 when Henry Bessemer came up with a more effective way to introduce oxygen into molten iron in order to reduce the carbon content.

Now known as the Bessemer process, Bessemer designed a pear-shaped receptacle—referred to as a 'converter'—in which iron could be heated while oxygen could be blown through the molten metal.

Prices for steel rail dropped more than 80% between 1867 and 1884, as a result of the new steel producing techniques, initiating growth of the world steel industry. Using high temperatures to burn off excess carbon and other impurities, the process relied on heated brick chambers below the hearth. Regenerative furnaces later used exhaust gasses from the furnace to maintain high temperatures in the brick chambers below (Bell, 2017).

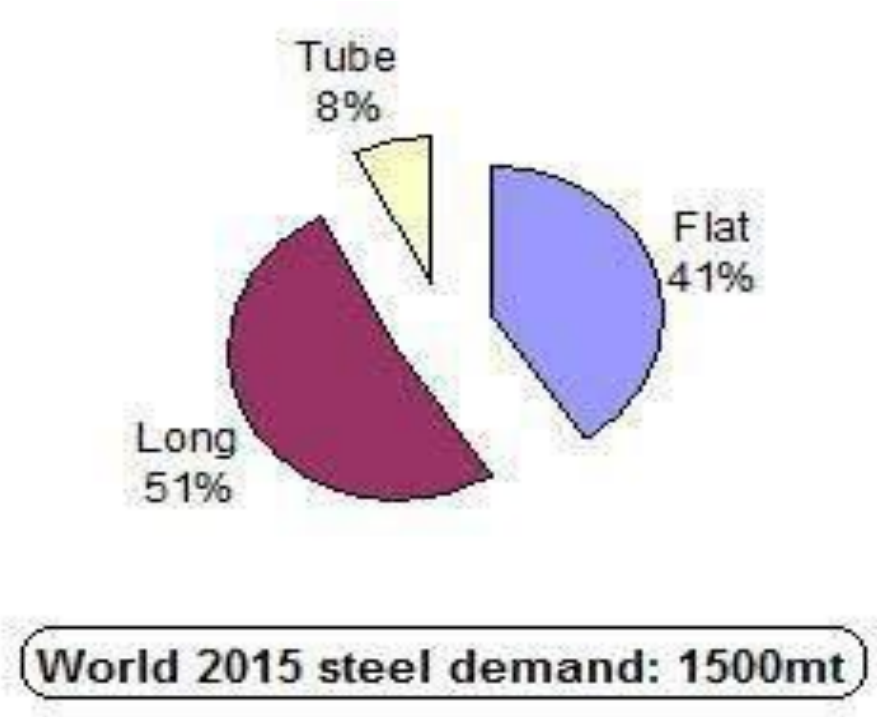
This method allowed for the production of much larger quantities (50-100 metric tons could be produced in one furnace), periodic testing of the molten steel so that it could be made to meet particular specifications and the use of scrap steel as a raw material. Although the process itself was much slower, by 1900 the open hearth process had largely replaced the Bessemer process.

Just after the turn of the century, another development occurred that would have a strong influence on the evolution of steel production.

In Ethiopia, industry emerged as a modern economic entity only at the turn of the 20th century. The establishment of a strong central government, expansion of cities associated with the installation of railways and the strengthening of foreign relations increased the demand for imported manufacturing commodities. This, in turn, encouraged the establishment of import-substituting factories domestically and as a result, modern manufacturing enterprises began to emerge in the 1920s (Gebreeyesus, 2015).

According to some knowledgeable people, heavy steel industries in Ethiopia started some few years before downfall of King Haileselassie’s regime with Italian investors with re-bar manufacturing. Further, they say the first re-bar factory was owned by an Italian investor, named Mr Risso. That company was founded in 1959, by the name Ethiopian Iron and Steel Factory (EISF) which is located in the south skirt of Addis Ababa, (Akaki Kaliti sub-city). Until recently, EISF was active in operation with a total of annual capacity of 12,000 ton. (Metal and Mining, 2018). In addition to imported billet, the foundry had been using smelting steel scrap for its re-bar and wire-rod production.

Fig.1: *Long products; mainly re-bar coverage in world steel production*



Source: (Kotas, 2017)/ estimates.

Table 2.1 ***Basic Metals and Engineering Industries and Regional Distribution***

Types of sector	Regional Distribution							
	Tigray	Amhara	Oromiya	SNNPR	Harery	Addis Ababa	Dired awa	Total
Basic Metal Industry	8	3	10	--	--	16	2	39
Engineering Industry	30	9	33	15	1	63	4	155
Total	38	12	43	15	1	79	6	194

Source: (Alemu, Solomon, & Tekeste, 2014)

According to the above Table 2.1, there are about 39 basic metal industries in Ethiopia. 26 (66.7%) are in Addis Ababa and Oromiya region around Addis Ababa. The re-bar manufacturing companies are classified as basic metal industries.

2.2. Policy and Procedures of Basic Metal Industries

2.2.1. Policy Environment

The government of Ethiopia has undertaken various policy measures targeting sustained economic growth. To achieve this objective, the country follows a market economy and recognized the private sector as the engine for economic development. It also recognizes the importance of competition at firm, industry, national, regional and international levels. To enhance competitiveness, the government has formulated different policies that were implemented at different stages. Beyond formulating policies, it has also been aggressively investing on development of human resources, infrastructures and powers which are the core for competitiveness.

The existing policies of the country, in one way or another, underscore the importance of the metal and engineering sector. However, policies specific to some strategic product items like the reinforcement structural steel industry are not boldly formulated. With regard to customs regulation, the sector is less protected when compared with the highest output tariff rates for garment (35%), footwear (35%) and textile (35%) industries. (Habtamu Workineh and Gashaw Desalegn, 2015) Even the gap between tariffs imposed on raw material and finished products is

narrow for metal and metal products industries. Tariffs on iron ore in East African countries is nil, but much higher in Ethiopia. Final products are also better protected in the community than in Ethiopia. This exposes firms to face strong competition from the rest of the world at their infant stage.

Both import substitution and export-oriented industries are given huge attention in the Industry Development Strategy of Ethiopia. Some of the industry sub-sectors that are given top priority in the development effort of the government are textile and garment, meat, leather and leather products, agro-processing and construction industries. In this document, basic metal and engineering industries are not targeted as priority areas like the textile and leather industries. Other policies like the educational policy also recognize national competitiveness. Higher education and improved skills are critical for development and productivity enhancement. Since 2010/11 the government has been following a policy that increases enrolment in graduate and post-graduate programs in line with the 70/30 program, which is 70 percent in science and technology and the remaining 30 percent in social science fields. Despite all the efforts to develop the country's most important asset – human resources, there are still shortages of critical skills for industry, including shortages of engineers, designers, technologists and technicians. The inadequacy of industry specific skills is caused by shortage of industry specific training facilities and the weak university-industry linkage (Habtamu Workineh and Gashaw Desalegn, 2015).

2.2.2. National Science, Technology and Innovation Policy

The National Science, Technology and Innovation Policy stress the need for scaling up endogenous knowledge and linkage between firms in the economy. The policy clearly put the milestones on research expenditure, number of researchers and patents, utility models and technology licenses granted, and number of publications between 2010 and 2025. Metal and Metal products engineering is given due emphasis in this policy.

To this effect, the National Science, Technology and Innovation Policy recognizes the importance of absorbing and mastering imported technology (technology transfer) by building upon indigenous knowledge and exercising creativity in the development of new products and processes. It also gives appropriate emphasis on creating and strengthening the local linkages that support the modification of production processes to bring cost down, increase efficiency and ensure environmental sustainability.

2.2.3. Industrial Policy

The Industry Development Strategy of Ethiopia, which has been in place since August 2002, primarily focuses on the promotion of agricultural-led Industrialization, export-led development and expansion of labour intensive industries. Some of the industry sub-sectors that are given top priority in the development effort of the government are textile and garment industry, meat, leather and leather products industry, agro-processing industries and construction industry. Though metal products, are not explicitly mentioned as a separate topic, it's briefly discussed as one of construction material (GCAO, 2012).

Nevertheless, as the Basic Metal and Engineering Industries (BMEI) has been considered as one of the priority industries for import substitution, a series of documents were prepared for building up the policy framework of BMEI in the course of PASDEP II formulation.

This includes:

2.2.3.1. Basic Metal and Engineering Industry Development Strategy and Action Plan (BMEI Strategy) drafted by MPDC/MOTI in 2008;

2.2.3.2. Metal and Engineering Industries Sub-sector 5-Year Development Plan 2003-2007 EFY (BMEI 5-Year Plan)prepared by MPDC/MOTI in May 2010; and

2.2.3.3. The BMEI Strategy is well structured and has a smooth flow from general and technical background to performance review, circumstance (infrastructure, human resources and policy), gap analysis and development strategy. On the other hand, strategic issues, strategic objectives and goals and action plans presented in the BMEI Strategy need to be more logically consistent. The document is informative with some detailed data and 100 pages of contents but additional industrial information and data are required to capture the whole picture of the BMEIs. This is why the Firm-level Study was required to complement it. The BMEI 5-Year Plan was prepared as an input for PASDEP II, focusing on BMEI's possible role in import substitution. It was prepared in Amharic and only a summary was available in English. It was treated as a given framework for conducting the Firm-level Study.

The BMEI 5-Year Plan notes that 85% of demand for BMEI products is currently fulfilled by imports. To curve this, it sets various targets including:

- Gross production value in 2014/15 to be ETB101 billion, which equivalents five times the value in 2010/11;
- Steel demand to grow 28% per annum and per capita steel consumption to grow from 12.1kg (EFY2002) to 34.72kg (EFY2007);
- Forecasted demand for BMEI products by major industrial sectors in the next five years;
- Domestic design and manufacturing capacity targets in percent of forecasted demand for each industrial sector and each year (for example, 90% for the leather industry; 35% for the textile industry; 85% for the sugar industry; 85% for the cement industry; 95% for construction steel; 85% of small and medium transport vehicles at the end of the five-year period).

Compared with plans in other countries, the BMEI 5-Year Plan is clearer in terms of quantitative targets. The target figures are quite challenging and sometimes not certain whether they are targets or projection, but the figures and the plan itself are consistent with PASDEP II/ GTP. Approaches to achieve these ambitious targets need to be further elaborated and visualized including material flow, geographical strategies and vertical and horizontal industrial linkages. (JICA/MPDC(MIDI), 2010) In line with this, in June of 2010, the government of Ethiopia issued Regulation No 182/2010 for the establishment of Metals Industry Development Institute.

The objectives of the institute are to facilitate the development and transfer of metals and engineering industries technologies and to enable the industries become competitive and effect rapid development.

To this end, the institute is expected to formulate policies, strategies and programs that assist in the facilitation of the development of metals and engineering industries and implement the same up on approval. Moreover, among many powers and duties vested to the Institute, under taking studies, providing support and consultancy, delivering testing services, extending support in the creation of input and output linkage, conducting research and training, are worth mention to show the government policy direction towards the development of the sector. (Ethiopia, 2010).

On top of the specific policy on metal sector, the science, technology and innovation, the industry policy, the investment policy have many elements in favor of the development of metal sector.

2.2.4. Investment Policy

Investment areas reserved exclusively for Ethiopian nationals are banking, insurance, micro-credit and savings, packaging, forwarding and shipping, broadcasting, mass media, attorney and legal consultancy, preparation of indigenous traditional medicines, advertisement, promotion and translation works as well as air transport services using aircraft with a seating capacity of up to 50 passengers. This regulatory policy, Council of Ministers Regulations on Investment and Incentives, opens metal and metal products industries for foreign investors. Considering the sector as essential for the development of other sectors, the policy has also made the tax prohibition period relatively longer when compared to other industries.

2.2.5. Government Procurement Policies

Government procurement is by competitive bidding. There are no burdensome administrative procedures or special document requirements and efforts are still being made to make the procedures of public procurement more economical and efficient, fairer, transparent and non-discriminatory. The government's procurement policy is open to every potential bidder. In spite of this, the public investment and private metal and metal products industry linkage is weak, especially in mega projects such as the railway development, Grand Ethiopian Renaissance Dam and sugar industries. (Samuel, 2017)

2.2.6. Customs Regulation

In 2012, the industries with the highest output tariff rates were garment (35%), footwear (35%) and tobacco (35%). The minimum tariff rate is zero for fuel, cereal and armaments. There is variation across sectors and over time in the growth rates of tariff rates. The minimum tariff rate is for raw materials and machinery, and the maximum for finished products.

2.3. Capacity utilization

There is no generally acceptable definition for the concept of capacity. This stems from the fact that different disciplines such as political economy or organizational development views issues of capacity somewhat differently. Capacity utilization (CU) and capacity are complicated in defining, let alone interpret and measure in a consistent coherent manner. In this research Capacity Utilization (CU) is defined as an extent or level to which the productive capacity of a plant, firm, or country is being used in generation of goods and services, expressed usually as a

percentage; it is computed by dividing the total capacity with the portion being utilized (www.businessdictionary.html, 2017).

The perception of capacity fundamentally relates to output. CU often arises in the discussions of applied and theoretical issues at both macro and micro economic levels as its importance is becoming more crucial for firms' decision makers. Among firms, for example, the existence of excess capacity points to the fact there are elements of monopolistic tendencies within individual industries. The concept of maximum output used the idea of an economic production function. This asserted that capacity is an index combination of all fully utilized factors including capital stock amongst other factors. Further, since capacity is not entirely a replacement for the capital stock as it depends on the other factors of production, this has helped to extend the concept of capacity in an economic sense. The opinion and decisions of firm owners and entrepreneurs in a single firm, different qualities of inputs, effect of managerial competencies and so on, all influence the capacity output (Samuel, 2017).

It can be argued for instance that managers of firms are the best judges of what 'capacity' means. This is because that capacity output is considerably swayed by the availability of variable inputs and their respective costs, managerial aims and abilities and partly influenced by fixed stocks of capital. Therefore, it is safe to assume that management has the capabilities to vary the rate of capacity utilization depending on numerous factors. Entrepreneurs may translate capacity to mean 'practical' or 'preferred' capacity. Preferred capacity, in fact, results from the level of market demand prevailing from what the firms wish to manufacture at such market conditions (Vhristain, 2012).

2.3.1. Manpower capacity

Humans play a major role on the industrial shop floor especially when it comes to meeting targets. Humans on the production floor can be divided into two categories: workers or operators on the production line, and workers in the supporting department.

Humans capitalize most of the process on industries from the management to the final shop floor work-force (operators). An industrial environment is one in which there are a large number of people from various departments working together to meet set goals. When it comes to unmet goals, blame is shared by the supporting department as they also contribute to this matter. The

supporting departments play their role in maintaining the consistent pace of work on the industrial shop floor. There are three basic departments in industries which are the Total Quality Management (TQM), Production Planning and Control (PPC) and Maintenance. The TQM involves all the quality matters of the parts produced. The PPC involves planning the production process and supplies base on orders. The maintenance department is responsible for all the technical matters on the industrial shop floor. Most of the factories face problems due to unforeseen damages that the company will face if a task is not done on scheduled basis.

Essentially, humans capitalize nearly all the processes on the industrial shop floor from the management to the shop floor workforce level. When it comes to unmet goals, fingers are not to be pointed to an individual, whereby the supporting department also has their contribution on this matter. Monitoring of supporting departments in industries is another factor which should be taken into account for improving the production performance. By knowing their performance, the departments can be aware of the problems arising and counter measures can be taken to further improve their working quality (S. K. SUBRAMANIAM, S. H. HUSIN, Y. YUSOP, 2010).

$$Manpower\ Utilization = \frac{(Operator\ Ideal\ Cycle\ Times\ X\ Total\ Piece\ Produced)}{Actual\ Operation\ Time - (Machine\ Ideal\ Cylce\ Time\ X\ Total\ Piece\ Produced)}$$

2.3.2. Technology capacity

Capabilities involve learning and accumulation of new knowledge on the part of the firm, and the integration of behavioural, social and economic factors into a specific set of outcomes. Consequently, capabilities are to be taken as the results of adaptive learning processes that, collectively, can be highly localised, giving rise to 'system' capabilities, i.e. referring to a specific spatial and industrial setting. For instance, an endowment of highly qualified human resources is not a capability per se, but a resource that, through learning, may become a source of technological capabilities for the firm or the system as a whole. In other words, variables related to human resources, or cooperative linkages for innovation with external actors, are to be considered as (among the) determinants of a firm's technological capabilities, rather than as the capabilities themselves (Forschungsinstitut, 2009, p. 3).

2.3.3. Machinery capacity

When it comes to the manufacturing process, machinery is a very common word in industry especially for higher rate of production output. Since the investment in machinery is high, industries try to maximize their usage in the shortest time possible.

Even the management in industries around the world strives towards the optimization of machinery yet this is not to their concern when targets are met. The awareness of true data on machine efficiency is neglected and the results are unwanted purchases of machines. These could be avoided if only the true data is analyzed and counter measures are taken by the responsible personnel.

Overall Equipment Effectiveness (OEE) is a pre-eminent practice for monitoring and improving the efficiency of the manufacturing processes such as machines, cells, assembly lines, etc. OEE is simple and practical yet a powerful calculation tool.

It takes the most common sources of manufacturing productivity losses and places them into three understandable categories which are availability, performance and quality. By doing so, it distils complex production data into simple understandable metrics that provide a gauge for measuring true manufacturing efficiency. It also forms the foundation for tools that help to improve productivity.

Planned downtime is subtracted from total planned shift length. This includes all events that should be excluded from efficiency analysis because there is no intention of running production (meal breaks, scheduled maintenance and when the management decides to stop production). The remaining time is planned operation time as per in the production schedule. All events that stop planned production for a length of time fall under unplanned downtime. The possibilities of such events are equipment failures/breakdowns, quality problems, material shortages, and most importantly, changeover time. Changeover time is the time wasted in between shifts i.e. a form of downtime that can be reduced. The remaining time is called actual operation time which is the effective production duration (S. K. SUBRAMANIAM, S. H. HUSIN, Y. YUSOP, 2010, p. 72).

2.3.4. Management capacity

Capacity Utilization (CU) is central margin for understanding of put fluctuation in output at the plant and aggregate level, and in a firms' decision about subtracting or adding from their stocks of factors of production and as well as for understanding and enhancing measures of

productivity. The rate of CU is a fundamental productivity variable in economic analysis. It tends to measure the magnitude to which actual output varies from capacity or normal output. If actual output falls short of normal, it points to the fact that there exists underutilization of capacity while if actual capacity surpasses normal, we deduce that there is over utilization of capacity (Vhristain, 2012).

2.4. Measurement of Capacity Utilization

A good number of measures have been widely cited in most economic and financial literatures. However, it is worthy of mention that there is no undisputed harmony regarding which particular measure is most suitable for measuring Capacity Utilization (CU). Further, most of these measurements provide light clarification as to why CU fluctuates overtime. Based on economic literatures, the following are some of the recognized measurements (Vhristain, 2012).

2.4.1. Survey-based Measurement

The widely accepted of obtaining numerical ratios of Capacity Utilization is inquire from firms for their own personal appraisal or evaluation of the magnitude to which their available capacity has been put to use in their diverse plants. Many financial institutions and governments include this query in their data gathering parameter; the enterprises survey an arm of the World Bank for example, includes this variable in its survey list for enterprises across select countries all over the world.

2.4.2. Peak-to-peak Measurement (Wharton Index)

This measurement originated from the Irish manufacturing sector. This approach endeavors to quantify the intensity of input utilization by looking at varying levels of output overtime. The CU measurement according to this technique cannot be more than unity.

This approach has the advantage of easily deriving an important economic indicator. For some countries, this index is usually made accessible either monthly or quarterly.

2.4.3. The Production function Measurement

This measurement denotes an effort to apply the industry production level with the intention of measuring capacity utilization. In this instance, the concept of capacity that is implied here is the same as the conceptualization used by economists in the perception of maximum output corresponding to all factors of production, and consists of capital stock where the method of estimation relying on the production function.

This measurement approach borrows from the peak-to-peak method the empirical aim of striving to measure the level of capacity output that could possibly be produced given that all the available inputs are completely optimized. However, this method stands out in the sense that once an industry's or firm's production function has been estimated, calculating capacity output then becomes easier as we simply evaluate the output at the points where all resources are fully utilized. It should be noted that measurement of CU using this approach signifies a substantial advancement from the above-mentioned approaches.

2.5. Under-capacity Utilization as Recurrent Challenge

Currently, there are about ten operational re-bar manufacturing plants in Ethiopia. A look into their geographical distribution of medium and high scale re-bar manufacturing industry indicates that most of them, about 90%, are located at Oromiya region and Addis Ababa city administration. Ethiopian re-bar manufacturers are currently producing re-bar of grade 40, 60 and 75 with product size ranges of diameters from 8 to 32 mm (Demoz, 2014).

The major local applications of re-bar products are building and other civil works to complement weak tensile capacity of concrete especially in tension zone during loading. The direct raw materials for the reinforcement bar manufacturing are basically billets and/or scraps. In Ethiopian context, currently, since there is no iron ore extraction facility, the main source of direct raw material are billets from import, and scrap mainly from local sources.

Currently, METEC is given a directive of managing the operation of collecting and distributing scraps from government organizations for better management of local scraps supply in the country by minimizing unjustifiable escalating of scrap price by some unlawful trade practice. METEC is also a major supplier of scrap for reinforcement bar local manufactures. However,

some factories are also collecting the scraps by using collection shop in different regions established for such purpose and/ or others are purchasing from local scrap collectors. Factories with recycle facility and a scrap as wastage are also the local suppliers of scraps. Most scrap collectors and sellers are located around Addis Ababa, specifically in market place called Markato/Menyaleshe Tera. Some factories are also importing of scraps from China, Ukraine, and Turkey etc. Billets are also imported as raw materials input by re-bar manufacturing plants especially by those plants without melting shop or furnace.

Almost all re-bar manufacturing plants are selling their product to local market through their sells outlets at different locations in Addis Ababa and other cities in different regions. There have also a practice of selling their product from their factory and through agents (Demoz, 2014, p. 67).

Even though there is relatively high installed capacity, Ethiopian re-bar manufacturing companies are currently operating with low capacity utilization rate. According to some research findings, for instance, in 2011, the capacity utilization was 23%, in 2012 it was 32%, in 2013 it was 30%, in 2014 it was 24.94%, and in 2015 it was 32% (Guta, Aman, & Abdo, 2016).

Iron and steel industries are considered as key subsector to build strong platform for sustainable industrial transformation as steel has wide application and linkages with almost all economic sectors. The rational importance of the subsector and significant contribution for the economic development implies that the industry requires a separate policy/ strategy that match its importance on the country development. While the rapidly developing economy in Ethiopia is steel intensive that need a profound base of the subsector, there is no iron and steel industry policy and strategy (Zehrudin, 2016).

In this regard, the last five years capacity utilization statistics compiled by MIDI showed that the under-capacity utilization is a recurrent problem of re-bar manufacturing companies for the last consecutive of years. In addition to this, a recent study complied by a joint team of RUHE Long and Flat Products Consultancy PLC (local industrial consulting firm), and the Metal Consulting International (a U.K. based industrial consulting company) described the weaknesses of the Ethiopian Iron, and steel sector as its low capacity utilization mainly due to lack of electric power and demand (market) p. (MCI, 2017, pp. 84-85). The study further explains, the rate of

capacity utilization of long product industries (which are mainly the re-bar manufacturing industries) is only about 46% in the year 2015 (MCI, 2017, p. 3).

The other striking issue, according to the same study, is that only 20% of the Ethiopian current steel market demand is covered by the local manufacturers while the routs to Ethiopian market suggest that, there is much scope for local firms to expand their value-adding activities by improving capacity utilization and output (MCI, 2017, pp. 9-10).

Though some research findings mentioned some factors for the under-capacity utilization problem, the researcher come across with no one clear finding regarding the major possible cause(s) in such a way that is put in order of their impact. Moreover, the possible remedies to be taken are not seen clearly. Lack of clarity in seriousness level of the causes may create a blurred vision on the stakeholders as to what intervention, and who should take responsibility to attain practical result in the process of mitigating the capacity utilization challenge of Ethiopian re-bar manufacturing industries. This is the ultimate intention of the researcher in undertaking this study.

In line with this, the under-capacity utilization challenges of the industries seem to be more aggravated with much more competition from imported products, as well as from new local entrants in the industry (Samuel, 2017).

According to a recent research conducted by the Ethiopian policy and research institute (EPRI, 2017), Ethiopian manufacturing sector in general is facing serious under-capacity utilization problem. In this report, about 70% of the manufacturing industries of which 88 samples were taken are using under-capacity with a rate of 58.14%. As the research finding has revealed, the possible causes for the under-capacity utilization of Ethiopian manufacturing industries mentioned by the investors are identified as:

1) Electric power cut off,

2) Industrial inputs problems (shortage, high price, low quality),

3) Foreign currency shortage,

4) Finance loan storage, (esp. for working capital),

5) Lack of Market (demand),

6) Manpower problem (lack of skilled man power, and availability in the market),

7) Public service problems (in governmental service giving offices).

On the other hand, there are different problems emanated from the industrialists (investors) themselves. Among these problems, recruiting and placement of appropriate manpower at proper positions, reluctance on using appropriate or state of the art technologies, and being passive for creative or innovative ways of doing things, and generally lack of modern management and industrial leadership are shown as failures (EPRI, 2017, pp. 6-7).

Thus, in formulating a policy/ strategy document that shows the challenges, prospects, and policy/strategy options for the development of iron and steel sub-sector in order to achieve Ethiopia‘s vision of becoming a middle income country by 2025 within the sub sectorial development perspectives, FDRE, Policy Study and Research Center (EPSRC), has pointed out that enhancing of capacity utilization of existing iron and steel industries, should be treated as a first priority among the five interrelated sub strategies, which are:

I. Enhancing capacity utilization of existing iron and steel industries
II. Expansion and diversification of the scope and depth of existing industries value chain
III. Establishing upstream iron and steel industry
IV. Enhancing research, technology transfer and development to strengthen technological and innovation capability
V. Adherence to environment and green manufacturing compliance

Referring to the would-be interventions by the government, the study findings recommends a support scheme of increasing financial capacity and economic procurement system to obtain the input raw materials and revising taxation policies. The financial and coordination effort involves bulk purchasing system for key raw material inputs to obtaining lower prices (economy of scale) and increased aggregated finance. Further, the favorable taxation policy for reducing high input material costs involves providing incentives such as eliminating taxes for non-domestically-available inputs until sufficient local production capacity is built. The overall operational capability development needs also embracing modern production, management methods and best practices like Kaizen to bring improvement in capacity utilization, productivity and production volume. Thus, leveraging existing capacity and seizing available market opportunities enable industries to take competitive advantage (Zehrudin, 2016).

In addition to the above-mentioned research findings, the researcher could observe grievances of representatives of the Ethiopian Association of the Basic Metal and Engineering Industries against some decision makers of public procurement offices for their poor attitude and misunderstanding on quality of local re-bar products. The sector association claimed that some procurement bodies prejudge local products as inferior quality without conducting appropriate laboratory tests. The association people further assert their argument explaining how a bias towards imported products is a big challenge for the local manufacturers (Samuel, 2017) . In according to another research, the Ethiopian re-bar manufacturing industry sector is suffering the following hindrances (Demoz, 2014):

- Inadequate system and capability of marketing and distribution
- Insufficient information on market requirement and customer feedback
- Poor market and distributional strategy especially promotional and pricing strategy

The research further found out some possible remedial recommendations, as listed here under:

- Introducing better marketing strategy to enhance their local market share.
- There is a need of system for conducting periodic customer survey and measuring level of customer satisfaction as well as making use of it for improving service level.
- Building capacity of staffs towards better sales and marketing.
- Enhance the quality of promotional efforts in coordination with other government organizations towards improving inadequate attitude on local re-bar products (Demoz, 2014).

Though the above discussed findings gave highlight on the sectorial challenges, still the major causes of the under-capacity problems are not clearly identified and prioritized so that viable remedial platform to be devised.

To this end, this research would focus on two basic concerns as depicted below:

- Identifying and prioritizing the major possible cause of under-capacity challenges of re-bar manufacturing sector,
- Identifying the possible remedial solutions for the identified possible causes of under-capacity utilization challenges of re-bar manufacturing industries, as more explained at the research question section written here under.

Addressing the under-capacity utilization of re-bar manufacturing industries will have a big impact in resolving the chronic problem of basic metal industry in Ethiopia. Thus, massive projects in hydro power plant construction, housing construction, health and education centre buildings, and other public service projects are immense potential market for the re-bar manufacturing companies which shouldn't be missed at this point of history.

Re-bar industries are basic metal industries, that if they grow up well, they will support the backward and forward business linkage in the metal and engineering sector, towards iron ore mining investment, as well as they give a good ground for those engineering industries by availing various channel and profile products on top of the re-bar products.

Considering all these factors, intervening on the problems of re-bar manufacturing industries bring a must-sure impact on Ethiopian Industrialization, even if it might not seem to be a quick-sure one.

2.6. Experience of re-bar manufacturing in developed countries

For most of the last decade, global crude steel production has been growing. Production totalled 1.1 billion metric tons in 2005 and by 2015 had grown 41.4 percent to 1.6 billion metric tons, which is an increase of 475 million metric tons over ten years. The major portion of total world steel production is for long and flat products, among which re-bar is the prominent one.

Global production dipped in 2009 following the global financial crisis but rebounded quickly by 2010. In 2014, global production hit a record high of 1.67 billion metric tons. Weak global demand for steel in 2015 caused a slight contraction in crude steel production worldwide, decreasing 2.8 percent from 2014. The World Steel Association has forecasted relatively stagnant steel demand levels for 2016 and 2017, which would indicate that production may hold steady at current levels in the near future. (U.S. Department of Commerce- International Trade, 2016).

Among eight world regions, Asia and Oceania produced 1.12 billion metric tons of steel in 2015, accounting for 69 percent of the 1.6 billion metric tons of global production. The European Union (28) was the second-largest steel producing region in 2015 with a 10 percent share of production (166 million metric tons), followed by North America with a 7 percent share (111

million metric tons) and the Commonwealth of Independent States (CIS) with a 6 percent share (102 million metric tons).

The distribution of shares by region held steady from 2014 but has changed markedly from a decade ago. Between 2005 and 2015, the majority of regions have seen their shares of production decrease, including the European Union, CIS, North America, South America, and Africa. The share of production held by Other Europe remained at 2 percent. Only the Middle East and Asia and Oceania had increases in their shares of global production between 2005 and 2015. Across the globe, steel production fell in 2015. North America saw the largest negative growth rate, at –8.6 percent, followed by Other Europe at 5.7 percent. Prior to 2015, steel production in Asia and Oceania and the Middle East had positive growth in every year since 2006, sometimes growing by double digits. All other regions experienced declines in steel production, especially during the 2008-2009 financial crises and again in 2012-2014.

Four of the world's ten largest steel producing countries are in Asia and Oceania: China, Japan, India, and South Korea. China is the world's largest steel producing country and accounted for nearly half of global production in 2015 at 49.5 percent — a total of 803.8 million metric tons. Japan ranked second at 6.5 percent of global production or 105.2 million metric tons production, followed by India (5.5% or 89.4 million metric tons), the United States (4.9% or 78.8 million metric tons), and Russia (4.4% or 70.9 million metric tons).

Over the past decade, global steelmaking capacity has grown in size every year. Between 2005 and 2015, 987.8 million metric tons of capacity were added globally — an increase of 71.8 percent. Unlike production, which fell during the global financial crisis in 2008-2009, steelmaking capacity continued to grow, though by nature, capacity is slower to respond to market conditions than production. After an 8.1 percent jump in 2013, global capacity growth began to slow. Since 2013, capacity has increased by 4 percent or 90.8 million metric tons.

CHAPTER THREE *: RESEARCH DESIGN AND METHODS*

3.1. Research Design

The research problem was identified through investigation and literature review of the Ethiopian metal and engineering, as well as other manufacturing industry sub-sector. The research includes literature review, focus group discussion, survey questions, and analysis, interpretation of data, conclusion and recommendation. The primary data gathering has been carried out through interviews, visits and distributing questionnaire. Moreover, the secondary data have been referred from reports, journals, articles, conference papers, electronic databases, and relevant internet sources.

The research started with exhaustive literature review to understand the subject matter in one hand and to answer some of the research questions on the other hand. At the beginning of the analysis, situational analysis was made to identify whether the under-capacity utilization of re-bar manufacturing industries is an existing significant problem. Then after, the exploration of its existence, the main causes and sub-causing factors of the under-capacity utilization of the re-bar manufacturing industries were identified through interviews, group brainstorm session, and survey questionnaire.

After the collection of necessary data, SPSS model was developed to assess the attitudes of respondents as to which is the major cause for the under-capacity of the industries, and the possible solutions for the same.

As re-bar industries are the first-hand victims of the problem, the leaders and the technical experts of the manufacturers are among main participants in this research. Furthermore, the association of metal industries, the governmental agency which is responsible for the growth of the metal and engineering industry sub-sector, named Metal Industry Development Institute (MIDI) are also considered as main source of information in the research process.

Questionnaire survey is developed and administered, in addition to individual interviews, and small circle discussion with peoples identified as sample for this research.

Even though different problems are mentioned here and there as a general problem of the re-bar manufacturing companies, the priority in accordance with their impact for the underutilization

challenge is not well researched. To this effect, the survey is conducted with questionnaires designed in such a way that the researcher may be able to rank as per the number of respondents replied for each items of questions.

After conducting a literature review on capacity utilization of manufacturing sector a survey questionnaire was developed. In this research, empirical data was collected from, Directors / General managers, Engineering department managers, Marketing/ commercial department managers of Ethiopian re-bar manufacturers, Metal Industry Development Institute, and Ethiopian Association of Basic Metal and Engineering Industries from the Addis Ababa and Bishoftu area to identify possible causes for the under-capacity utilization of re-bar manufacturer and to discuss remedial solutions for successful mitigation of the industries' underperformance.

3.2. Research Method

The first step in the methodology was conducting a thorough survey of the relevant literature. This includes review of relevant materials from research papers, articles, journals, published and unpublished documents and documents from previous related research studies, from metal manufacturing industries, support institutes as well as from Ministry of Industry and the internet and other sources.

Data has been collected from selected (representative) steel manufacturing industries and from different stakeholders; like Ministry of Industry, Metal Industry Development Institute, Central Statistics Agency, and, other relevant bodies. Focus group discussion and interview were made with different actors that are participated directly or indirectly in the re-bar manufacturing industries.

Exploratory research technique by using survey approach had been done to collect primary data from re-bar manufacturing firms, located in and around the capital city (Addis Ababa). The representative factories were selected by referring strategy studies for basic metal & engineering sub sector that were conducted in the past. A research instrument is developed to study the causes and possible remedies for the under-capacity utilization problem of re-bar manufacturing industries in Ethiopia. Based on the literature review, a data collection instrument in the form of a survey questionnaire is designed. The purpose of the survey is to identify the important practices and activities to achieve competitiveness.

Before an industry-wide survey is conducted, a pilot test has been carried out with randomly selected senior personnel working in the industries. The purpose of the pilot test is to determine the clarity, completeness and user-friendliness of the questionnaire. After the pilot test, based on the comments, amendments have been made to improve the questionnaire. Around 50 survey packages were distributed for the selected companies and institutes and about 4 companies/and institutes of all sizes in the sector were visited and interviewed. While the questionnaire is designed to be self-administered, respondents have also been offered the option of providing verbal replies through face-to-face interviews. The companies among others were selected based on by their the number and range of products, growth value of production, investment in fixed asset, production outputs and sales volume, manpower development and financial review, willingness for cooperation

After the data collection and desk work finalized, the outlook assessments of respondents on possible causes and solutions of under-capacity utilization of Ethiopian re-bar manufacturers were made based on a Likert model. Then, the key feature of the proposed model is consulted with key stakeholders. These stakeholders include: Government (Ministry of Industry- at national level), Metal Industry Development Institute (MIDI), and Basic Metal and Engineering Association (at institutional/ sectorial level), selected steel manufacturing industries and export industries (at firm level). Finally, conclusions and recommendations were proposed that may enhance the capacity utilization of the manufacturers.

3.3. Population and sampling technique

There are about 10 operational re-bar manufacturers in Ethiopia which are supported by metal industry development institute (MIDI), and the national sector association named Ethiopian Association of Basic Metals and Engineering Industries (EABMEI) (Fitea, 2017). Since the assessment of causes and possible solutions for under-capacity production of the industries is much more related with managerial and relevant expertise functions, the researcher focussed purposefully on the top managers, department managers, and relevant experts in a total of 12 organizations (The ten manufacturers and the two support institutes).

With this in view, at an average of six management and expertise staff from each organization, we would have had about 72 population size. However, due to time and financial constraints, this

research was conducted purposefully on the selected four industries based on their relatively better activities in the sector.

The relevant samples for this research are higher officials of three target categories: Metal Industry development (MIDI), Ethiopian Association of Basic Metals and Engineering Industries (EABMEI), and the re-bar manufacturing companies.

The study employed stratified random sampling technique, and thus general managers/general directors/presidents, technical and engineering department, and directors of marketing or commercial departments, who are assumed to have a direct relevance with that of the research topic. To this end, with the 10 active local re-bar manufacturers and 2 support organizations which are the Metal Development Institute, and the Ethiopian Association of Basic Metals and Engineering Industries, we will have a total population of 36.

A number of formulas are available for working out sample size, but I use the simplified formula for proportions (Yamane, 1967). In this formula, the assumptions are as follows:

95% confidence level

P=.5

$$n_o = \frac{N}{1 + N(e)^2}$$

Where:

n_o- is the sample size,

N- is the population size

e- is the level of precision

Therefore, putting the given information in the formula, I calculated the sample size as follows:

$$n_o = \frac{72}{1 + 72(.05)^2}$$

n_o=61

But, as it is stated above, the total population, which is 72, is relatively small, and thus, the sample size, can be further adjusted using the corrected formula:

$$n = \frac{n_o}{1 + \frac{(n_o - 1)}{N}}$$

Therefore,

$$n = \frac{61}{1 + \frac{(61 - 1)}{61}}$$

$$n = 33$$

Accordingly, the above sample number calculation, it would be enough if the researcher uses 33 samples. But, since the availability and accessibility of more samples is secured, 36 samples are used in the administration of the survey (B.K, 2014).

As the research objective is focused on assessing, weighing, and pointing possible remedial solutions on the possible causes of the under-capacity utilization of the re-bar producers, such issues are well treated at managerial perspective.

To assist with designing the questionnaire, relevant experts from the three identified groups were asked for input on the drafted questions in order to evaluate the ordering, comprehensiveness and completeness of questions, as well as to verify that the appropriate information would be obtained from those participating in the study.

Table 3.1: ***The Number of Participants/samples by role and organization***

Organization	Major Role				Total
	General manager/President	Technology manager	Marketing manager	Expert	
Re-bar Manufacturing Company	4	4	4	4	16
Association	2	1	1	3	7
MIDI	2	4	2	5	13
Total	8	9	7	12	36

Source: *Own research finding*

As it can be shown here above Table 3.1, out of the three groups of populations, 36 participants are targeted from different organizational roles, from the top leadership up to relevant expert level who are taken as knowledgeable resources for the case. Therefore, 8 people at the highest leadership position, 16 people at the department manager level, and 12 people from experts' position were involved in administering the survey questions. All approached participants have responded differently for various questions. Some of the participants didn't respond for few questions and the missing ones are indicated in the subsequent tables at each items of the survey.

The questionnaires were divided in two sets of questions; the first set is to assess the possible causes for the under-capacity utilization of re-bar manufacturers, and the second set analyzing the possible remedial actions to be taken mainly by the government side.

Based on literature review and comments provided by industry experts a preliminary list of potential barriers that lead the industries into chronic under-capacity utilization problem are identified. This list of barriers was used to develop the first part of the questionnaire in order to identify the extent of such barriers. The possible causes to be verified with this research are:

- Shortage of Electric Power
- Lack of foreign currency
- Lack of working capital

- Lack of market
- Lack of proper management and leadership
- Lack of appropriate skilled manpower
- Unfair competition with imported products
- Monopolistic nature of competition among local manufacturers
- Reluctance of public procurement offices to buy from local manufacturers

Questions in the second set included related to public procurement policy adjustment, banning of imported finished re-bar products, and hard currency priority that is supposed to be intervened by the government. Thus, a number of questions were intended for a specific group of participants from manufacturing industries, the Metal Institute, and Association of Basic Metal Industries.

3.4. Data collection tools and methods of data analysis

The researcher used face to face interview, focus group discussions, or observation, and survey questionnaires. The researcher used a mix of quantitative and qualitative methods. This is because the under-capacity utilization problem of Ethiopian re-bar manufacturing industries has an objective aspect to be analyzed quantitatively; on the other side, it has subjective perspective to be observed from stakeholders' opinions and knowledge.

The data set that the researcher intends to collect is designed in such a way that the researcher may be able to meet the proposed research objectives, which are:

- To identify possible causes of under-capacity utilization of re-bar manufacturers,
- To explore the seriousness level of each challenge with respect to the capacity utilization rate of the industry,
- To find out how problems and challenges of re-bar manufacturers might be intervene by the concerned stakeholders to enhance capacity utilization of re-bar producers.

Accordingly, the data is to be collected via a survey format which comprises mainly three categories of questionnaires. The first category is focused on assessing basic facts of the respondents. The second category, which is the core objective of this research, is planned to assess the possible causes of the under-capacity utilization of the re-bar manufacturing

industries. Lastly, the third category is of questions that help in assessing the possible remedial solutions for the identified problems of the under-capacity performance of the industries, that may help me to give a highlight on the possible remedial actions to be taken in resolving the problem.

Therefore, the appropriate actions to be taken for the ultimate goal of alleviating the under-capacity utilization problems of re-bar manufacturing industries in Ethiopia has to be analyzed quantitatively and qualitatively.

To this end, data available from concerned bodies and perspectives of relevant people must be assessed and viewed and analyzed together with both quantitative and qualitative ways.

Therefore, in order to reach reasonably appropriate findings, the researcher made use of a formative and summative evaluation mixed method design. Using this mixed method, the researcher could compare and integrate the main findings out of the data collected from the Metal Industry Development Institute (MIDI), the re-bar manufacturing industries, and the Association of Ethiopian Basic Metals and Engineering industries with perspectives of other relevant stakeholders (Creswell, 2014, p. 281).

A survey format is designed and distributed for about 36 respondents who are selected as per stratified sampling technique.

In doing so, the researcher has focused on mainly two groups of populations, which are, the 'Re-bar Industry' side, as well as the relevant 'government institution's side, which is the responsible body for the development of the Ethiopian metal sector, namely the Metal Industry Development Institute (MIDI).

Thus, the respondents are selected from the following categories:

- The Re-bar manufacturing industries,
- The Ethiopian Associations of Basic Metals and Engineering Industries,
- The Metal Industry Development Institute.

In the selected populations, the appropriate samples (people and data) could be accessed to meet my research objectives.

In order to get proper representation in the sample, the researcher focussed on the top managerial positions, who are directly involved in dealing the issues of under-capacity performance in one way or another.

Within each stratum, the sample contains individuals who are supposedly highly involved in their respective organizations with the issue of the research questions and objectives. Thus, each target population group is represented with the samples identified as follows:

- The General Director/General Manager/President/C.E.O. level
- The technology/engineering/production department manager level
- The marketing/commercial/supplies department manager level
- The relevant expertise/engineers/economists level

CHAPTER FOUR *: EMPIRICAL RESEARCH FINDINGS AND DISCUSSION*

4.1. Under-capacity utilization is a re-occurring problem

Under-capacity utilization problem of re-bar manufacturing industries are often reported by the industries themselves, as well as the relevant bodies, like the Metal Industry Development Institute (MIDI), and the Ethiopian Basic Metal and Engineering Industries (EABMEI). (MIDI, 2016). However, the researcher believed that starting from the assessment of the existence of under-capacity production problem in re-bar manufacturing companies as per the views of respondents would be wise.

Table 4.1: ***Assessment of reoccurrence of Under-capacity production (by Organization)***

Respondents role	Strongly Agree		Agree		Total Agreement		Neutral		Disagree		Strongly disagree	
	No	Row Total N %	No	Row Total N %	No	Row Total N %	No	Row Total N %	No	Row Total N %	No	Row Total N %
Re-bar manufacturing companies	7	43.8%	8	50.0%	15	93.8%	0	0.0%	0	0.0%	1	6.3%
Association	4	57.1%	3	42.9%	7	100.0%	0	0.0%	0	0.0%	0	0.0%
MIDI	3	23.1%	10	76.9%	13	100.0%	0	0.0%	0	0.0%	0	0.0%
Total	14		21									

Source: *Own research finding, 2017*

Table 4.1 above, 7 (43.8%) respondents from the industries strongly agreed that under-capacity production problem is a challenge that the Ethiopian re-bar manufacturing industries have been facing on a repeated basis, and 8 (50%) also agree that the problem is reoccurring. This shows that 15 (93.8%) respondents from the re-bar manufacturing industries believed that the under-

capacity production problem has been a continuous challenge of the manufacturers for many years. Likewise, 4 (57.1%) respondents from the industries' association strongly agree, and 3 (42.9%) agree with the persistence of the under-capacity problem. On top of this, respondents from MIDI, which is the government body supporting the sector, 3 (23.1%) strongly agree, and 10 (76.9%) agree as under-capacity production problem is existing challenge for the industries. This shows, that 7 (100%) respondents from the metal association, and 13 (100%) from MIDI believed that the problem is continuing, respectively.

4.2. Major Possible causes of under-capacity utilization

Various causes may be considered as potential sources for the under-capacity problem of Ethiopian re-bar manufacturing industries. Electric power cut off, industrial inputs problems (shortage, high price, low quality), foreign currency shortage, finance loan storage, (especially for working capital), market (demand) problems, manpower problems (lack of skilled man power, and availability in the market), public service problems (in governmental service giving offices) are seen as potential reasons for the under-capacity problem of manufacturing industries in Ethiopia.

On the other hand, there are different problems that have emanated from the industrialists (investors) themselves. Among these problems are the recruiting and placement of appropriate manpower at proper positions, reluctance to use appropriate or state of the art technologies, being inactive when it comes to creative or innovative practices, and generally lack of modern management and industrial leadership. Therefore, the suggested causes of the under-capacity production problem of Ethiopian re-bar manufacturing industries are assessed against the response of selected respondents as shown in Table 4.3 below:

Table 4.3: ***Possible causes of under-capacity utilization (by roles)***

Major role		Possible causes									
		Electric	Forex	Capex	Market	Mgt and leadership	Skilled manpower	Import	Monopoly	PPDS	Other
General manager/President	Count out of 8	6	8	4	8	4	4	7	0	7	0
	Sub-Total %	75.0%	100.0 %	50.0%	100.0 %	50.0%	50.0%	87.5%	0.0%	87.5%	0.0%
Technology manager	Count out of 9	8	8	5	7	6	8	6	3	7	0
	%	89%	89%	56%	78%	67%	89%	67%	33%	78%	0%
Marketing manager	Count out of 7	6	7	5	7	3	4	7	1	7	0
	Sub-Total %	86%	100%	71%	100%	43%	57%	100%	14%	100%	0%
Expert	Count out of 12	7	10	7	10	8	5	10	4	9	0
	Sub-Total %	58%	83%	58%	83%	67%	42%	83%	33%	75%	0%
Total	Count out of 36	21	26	16	25	18	17	23	7	23	0
	%	58.33%	72.22%	44.44%	69.44%	50.00%	47.22%	63.89%	19.44%	63.89%	0.00%

Source: *Own research finding, 2017*

According to Table 4.3 above, 26 (72.22%) respondents confirm that lack of foreign currency as a major cause for the under-capacity production problem. In the same way, 25 (69.44%) respondents replied that 'lack of market (effective demand)' was a major cause for the under-capacity production of the industries. Moreover, 23 (63.89%) respondents indicate the influence of imported re-bar products as one of major causes. In addition, 23 (63.89%) respondents pointed out the 'irregularities of rules and regulation of the PPPDS' are some of major causes for the under-capacity production problem of re-bar manufacturing companies.

Beyond identifying the likely causes of the under-capacity production of re-bar manufacturing companies, respondents' agreement level on each potential cause is assessed as seen in Table 4.4:

Table 4.4: *Foreign Currency*

Question	Level of Agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Lack or shortage of foreign currency	Valid	Agree	19	52.8	59.4	59.4
		Strongly Agree	13	36.1	40.6	100.0
		Total	32	88.9	100.0	
	Missing	System	4	11.1		
	Total		36	100.0		

Source: *Research finding, 2017*

Lack of access to foreign currency is a serious cause which is strongly agreed by 19 (52.8%) respondents for the under-capacity production of re-bar manufacturing industries, and 13 (36.1%) respondents agree as it is analyzed in

Table 4.4: above. In summary, 32 (88.9%) respondents admitted that lack of access to foreign currency is one of the major causes for the under-capacity production of re-bar manufacturing companies in Ethiopia.

Table 4.5: *Electric Power problem*

Question	Level of Agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Lack or shortage of Electric power	Valid	Strongly Agree	11	30.6	32.4	32.4
		Agree	15	41.7	44.1	76.5
		Neutral	5	13.9	14.7	91.2
		Disagree	3	8.3	8.8	100.0
		Total	34	94.4	100.0	
	Missing	System	2	5.6		
	Total		36	100.0		

Source: *Research finding, 2017*

As depicted in Table 4.5 above, frequent shut down and interruption of electric energy is a serious cause which is strongly agreed by 11 (30.6%) respondents for the under-capacity production of re-bar manufacturing industries, and 15 (41.7%) respondents agreed. In summary, 26 (76.5%) respondents admitted that electric power problem is one of the major causes for the under-capacity production of re-bar manufacturing companies in Ethiopia.

Table 4. 6: Public *Procurement problem*

Question	Level of Agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Inconvenience of the practice, rules, and regulations of the Ethiopian Public procurement service	Valid	Strongly Agree	6	16.7	16.7	16.7
		Agree	17	47.2	47.2	63.9
		Neutral	10	27.8	27.8	91.7
		Disagree	3	8.3	8.3	100.0
		Total	36	100.0	100.0	

Source: *Own research finding, 2017*

According to Table 4.6 above, 6 (16.7%) respondents strongly agree, and 17 (47.2%) respondents agree that the practice, rules and regulations of Ethiopian Public Procurement services are inconvenient for the industries in creating appropriate market opportunities for the local re-bar manufacturers.

In summary, 23 (63.9%) respondents admitted that improper public procurement practices is one of the major causes for the under-capacity production of re-bar manufacturing companies in Ethiopia.

Table 4. 7: *Lack of Market*

Question	Level of Agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Lack of ample market* or insufficient effective demand	Valid	Strongly Agree	18	50.0	60.0	60.0
		Agree	10	27.8	33.3	93.3
		Strongly disagree	2	5.6	6.7	100.0
		Total	30	83.3	100.0	
	Missing	System	6	16.7		
	Total		36	100.0		

Source: *Research finding, 2017*

**Note:* *Potential market is from government projects*

As it is exhibited in Table 4.7 above, lack of market, or insufficient effective demand, is considered as one of the serious causes for the under-capacity production of re-bar manufacturing industries which is strongly agreed by 18(50%) respondents, and agreed by 10 (27.8%) respondents. In summary, 28 (93.3%) respondents admitted that lack of market is one of the major causes for the under-capacity production of re-bar manufacturing companies in Ethiopia.

Table 4.8: ***Working Capital problem***

Question			Frequency	Percent	Valid Percent	Cumulative Percent
Lack or shortage of working capital problem	Valid	Strongly Agree	2	5.6	6.9	6.9
		Agree	8	22.2	27.6	34.5
		Neutral	11	30.6	37.9	72.4
		Disagree	5	13.9	17.2	89.7
		Strongly disagree	3	8.3	10.3	100.0
		Total	29	80.6	100.0	
	Missing	System	7	19.4		
	Total		36	100.0		

Source: *Research finding, 2017*

As seen in Table 4.8 above, only 10 (35 %) of respondents affirmed that working capital problem may be one of the possible causes of under-capacity utilization rate of re-bar manufacturing companies. This shows that it is not seen as such a serious cause as compared to other causes mentioned in other tables.

Table 4. 9: ***Manpower problem***

Question	Level of Agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Lack or shortage of skilled manpower	Valid	Strongly Agree	7	19.4	22.6	22.6
		Agree	16	44.4	51.6	74.2
		Neutral	8	22.2	25.8	100.0
		Total	31	86.1	100.0	
	Missing	System	5	13.9		
	Total		36	100.0		

Source: *Research finding, 2017*

As it is seen in Table 4.9 above, it is found that 7 (19.4%) respondents strongly agree, and 16 (44.4%) agree 'skilled man power problem' is one of the major reasons for the under-capacity production of re-bar manufacturers. In summary, 23 (74.2%) respondents affirmed that 'man power problem' is one of the major causes for the underperformance of Ethiopian re-bar producers.

4.3. Stake holders responsible for the under-capacity problem

Table 4.10: ***Major stakeholder to take prime responsibility for remedy***

Major stakeholder to take prime responsibility for remedy	Strongly Agree	Agree	Total Agreement	Neutral	Disagree	Strongly Disagree	Rank (By %)
The government	4(11.8%)	25(73.5%)	29(85.5%)	3(8.8%)	2(5.9%)	0.0	1
The Metal Industries Development Institute	5(14.7%)	13(38.2%)	18(52.9%)	9(26.5%)	7(20.6%)	0.0	3
The re-bar manufacturing industries	0.0	19(65.5%)	19(65.5%)	8(27.6%)	2(6.9%)	0.0	2
The Ethiopian Association of Metal and Engineering industries	2(6.1%)	11(33.3%)	13(39.4%)	10(30.3%)	3(9.1%)	7(21.2%)	4
Universities and Research Institutes	0.0	4(20.0%)	4(20%)	7(35.0%)	6(30.0%)	3(15.0%)	5

Source: *Research finding, 2017*

According to Table 4.10 above, 29 (85.5%) respondents showed their agreement with the idea that the government should take the prime responsibility to enhance the capacity utilization of the re-bar manufacturing industries. It also found that 19 (65.5%) respondents agreed with the

concept as the manufacturing industries should play their role to make use of their full production capacity.

On the other hand, 18 (52%) respondents said MIDI should take the leading responsibility for improving the under-capacity production problem of the re-bar manufacturing companies. 13 (39.4%) said it should be the 'Association', and 4 (20%) said it should be 'the university'..

In line with this finding, the government as a whole, MIDI, and the manufacturing industries themselves must work together closely so that the under-capacity utilization of the re-bar manufacturing companies may be resolved.

4.4. Possible solutions for the under-capacity utilization problem

In assessing the possible solutions for the found out causes of the under-capacity production of re-bar manufacturing companies, various proposals are presented for the respondents so that they may propose the ones that they assume appropriate. The possible solutions hereunder in the subsequent tables are proposed in relation with the possible causes of the under-capacity utilization problem.

'Giving priority for hard currency', 'banning import of re-bar', 'facilitating bulk purchase of raw material' are the three key recommendations as remedial measures for the under-capacity problem of the manufacturers.

Table 4.11: ***Foreign currency earning***

Proposal	Level of Agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Availing Hard currency earnings for the industries	Valid	Strongly Agree	11	30.6	32.4	32.4
		Agree	19	52.8	55.9	88.2
		Neutral	4	11.1	11.8	100.0
		Total	34	94.4	100.0	
	Missing	System	2	5.6		
	Total		36	100.0		

Source: *Own research finding, 2017*

As it is shown in Table 4.11, 11 (30.6%) respondents strongly agreed, and 19 (52.8%) agreed with the possible remedial proposal of the hard currency availability as a significant solution for the problem of the under-capacity production of re-bar manufacturing companies.

To sum up, 30 (88.2%) respondents affirmed that actions of availing hard currency with a genuine priority for the re-bar manufacturing companies is the first remedial measures to be taken.

Table 4.12: ***Banning of re-bar products Import***

Proposal	Level of Agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Banning of finished re-bar importation'	Valid	Strongly Agree	10	27.8	27.8	27.8
		Agree	17	47.2	47.2	75.0
		Neutral	6	16.7	16.7	91.7
		Disagree	3	8.3	8.3	100.0
		Total	36	100.0	100.0	

Source: *Own research finding, 2017*

It could be depicted from Table 4.12 above, that 27 (75 %) of respondents took 'banning of finished re-bar importation' as remedial measure for the under-capacity utilization problem of the local re-bar manufacturing companies.

As the research was included some discussions with knowledgeable people in this area, the comments of many people showed that there is no such thing as a single intervention that might bring the desired result. Rather, what is necessary is a multi-layered approach, with the combination of many possible measures implemented together.

According to the opinion of some influential respondents, the government of Ethiopia should give genuine priority for the re-bar manufacturers in availing the necessary foreign currency at the right time with the right amount. Especially because at this time the huge amount of hard currency is allotted for the importation of finished re-bar products, and this must be stopped (Wend Yifraw, 2017), (Samuel, 2017). On the other hand, the industrialization process must be driven with the basic metal engineering industries, as the metal sector is taken as a mother of all industries, to promote the birth and growth of all other industrial engineering practices.

Table 4.13: *Bulk purchases* of *Raw Material*

Question	Level of agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Sufficient and timely raw material supply through bulk purchase arrangement	Valid	Strongly Agree	3	8.3	9.7	9.7
		Agree	19	52.8	61.3	71.0
		Neutral	7	19.4	22.6	93.5
		Disagree	2	5.6	6.5	100.0
		Total	31	86.1	100.0	
	Missing	System	5	13.9		
	Total		36	100.0		

Source: *Own research finding, 2017*

According to the findings in Table 4.13, sufficient and timely raw material supply for the re-bar manufacturers must be well managed and should be led by direct governmental support. This is exhibited by the affirmation of 22 (71%) respondents, which is further measured by 3 (8.3%) respondents with strong agreement, and 19 (52.8%) respondents with normal agreement, as it is seen above in Table 4.13.

Table 4.14: *Iron Ore exploration*

Proposal	Level of Agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Iron Ore exploration	Valid	Strongly Agree	7	19.4	21.9	21.9
		Agree	13	36.1	40.6	62.5
		Neutral	7	19.4	21.9	84.4
		Disagree	4	11.1	12.5	96.9
		Strongly disagree	1	2.8	3.1	100.0
		Total	32	88.9	100.0	
	Missing	System	4	11.1		
	Total		36	100.0		

Source: *Research finding, 2017*

As it could be referred in Table 4.14 above, Iron Ore exploration for the security of raw material availability is taken as one of the proposed solutions to solve the under-capacity utilization of re-

bar manufacturers with strong agreement of 7 (19.4%) respondents, and with a normal agreement of 13 (36.1%) respondents. In summary, 20 (62.5%) respondents are in agreement that iron ore exploration is a solution for the under-capacity production problem of re-bar manufacturing companies.

Table 4. 15: *Suppliers' credit facilitation*

Proposed solution	Level of Agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Facilitating and availing suppliers credit	Valid	Strongly Agree	5	13.9	15.2	15.2
		Agree	14	38.9	42.4	57.6
		Neutral	8	22.2	24.2	81.8
		Disagree	5	13.9	15.2	97.0
		Strongly disagree	1	2.8	3.0	100.0
		Total	33	91.7	100.0	
	Missing	System	3	8.3		
	Total		36	100.0		

Source: *Own research finding, 2017*

As displayed in Table 4.15 above, permitting the access of suppliers credit in availing raw materials and inputs is accepted as one of the recommended solutions to solve the under-capacity utilization of re-bar manufacturers with an agreement level of 19 (57.6%) of total respondents.

Table 4. 16: *Procurement law adjustment*

Proposed solutions	Level of agreement		Frequency	Percent	Valid Percent	Cumulative Percent
Adjusting and correcting the public procurement practices, rules, and regulations in favor of local re-bar manufacturers.	Valid	Strongly Agree	12	33.3	34.3	34.3
		Agree	21	58.3	60.0	94.3
		Neutral	2	5.6	5.7	100.0
		Total	35	97.2	100.0	
	Missing	System	1	2.8		
	Total		36	100.0		

Source: *Research finding, 2017*

As it could be referred in Table 4.16 above, adjusting government procurement law in favor of the local manufacturers to secure appropriate portion of local market which is mainly emanated

from the demand of public projects is seen as one of the recommended solutions to solve the under-capacity utilization of re-bar manufacturers with an agreement level of 33 (94.3%) respondents of total respondents.

On top of the above proposed solutions, the researcher has learnt from focus group discussion that strong control on illegal import and contrabands of re-bar products may serve as a plus for the remedial measures to solve the under-capacity utilization of re-bar manufacturers.

CHAPTER FIVE*: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS*

5.1. Summary

The under-capacity volume of production is still the existing challenge of Ethiopian re-bar manufacturers. Lack of foreign currency stands as the number one challenge with agreement of 72.22% of respondents. The second major possible cause, with 69.44% of respondents agreement, is lack of market, and the third factor, with 63.8% of respondents agree that negative influence of the imported re-bar, and the reluctance of the public procurement offices to buy from local manufacturers is a large factor in causing under-capacity production.

The problem related of public procurement is much more related to market issues. As per the respondents' responses, the public procurement agency is not working in favour of local re-bar manufacturers' expectations. 64% of respondents agreed that public procurement is one of the major possible causes of under-capacity production volume of re-bar manufacturing companies.

93% of respondents agreed that local re-bar manufacturers are suffering with lack of market while the skilled man power shortage is considered as one of the major reasons for the under-capacity utilization of re-bar manufacturers. 74% of total respondents agreed that the man power problem is one of the causes for the underperformance of Ethiopian re-bar producers; thus the companies need to establish relationships and work together with industry-oriented universities to obtain specialized, skilled man power to improve their capacity.

Government is the main responsible organization in line with stack holders in the protection of the manufacturing industries.

Accordingly, 85.3% of the respondents agreed that the government must take the lead for the enhancement for full capacity utilization of the re-bar manufacturing companies. Respondents also confirm that manufacturing industries are responsible with 65.5% agreement. Of all respondents, 53% agreed that the responsibility lies with the Metal Industry Development Institute, and 39.4% agreed that the responsibility sits with the Basic Metal and Engineering Industries' Association to solve those challenges.

Concerning government interventions in the capacity development of re-bar manufacturing companies, 96.8% (almost all respondents) agreed that the major solution to the challenges of the industry would be for the government to make foreign currency available to Ethiopian re-bar manufacturers.

Creating a reliable environment to the industries it will pave the way for local manufacturers to enhance their capacity to the highest possible. This in turn, will create a multidimensional positive impact on the process of industrialization of the country at large.

Similarly, 75 % of respondents confirm that the 'banning of finished re-bar importation' would work as a remedial measure for the under-capacity utilization problem of the local re-bar manufacturing companies.

According to the findings, 71% of respondents agreed that sufficient and timely raw material supply for the re-bar manufacturers should be covered by intervention and direct governmental support.

94. 4% respondents agreed that the government banning of duty-free import of re-bar products for some privileged investments, like hotel construction projects, would be one of the solutions for the under-production of local re-bar manufacturers.

Iron Ore exploration for the security of raw material availability is taken as one of the recommended solutions to solve the under-capacity utilization of re-bar manufacturers with an agreement level of 88.9% total respondents.

Permitting the access of supplier credit in availing raw materials and inputs is taken as one of the recommended solutions to solve the under-capacity utilization of re-bar manufacturers with an agreement level of 91.7 % of total respondents.

Adjusting the government procurement law in favour of the local manufacturers to secure appropriate portion of local market which mainly emanates from the demand of public projects is seen as one of the recommended solutions to solve the under-capacity utilization of re-bar manufacturers with an agreement level of 97.2% of total respondents.

On top of all these, strong control on illegal importation and contraband of steel products is seen as one of the workable solutions to solve the under-capacity utilization of re-bar manufacturers with agreement from 97.2% of total respondents by reducing its impact on creating unfair competitions.

5.2. Conclusion

Industrial capacity can be the basis of business success only if it is utilized to the maximum possible level. Ethiopian re-bar manufacturing industries are characterized by under-capacity utilization; currently at below 50% of their potential production capacity. As the re-bar manufacturing companies are highly capital-intensive and run a very large number of employees. The impact of under-capacity utilization is devastating for the metal sector, as well as for overall Ethiopian Industrialization.

The re-bar manufacturing production capacity utilization is at such a very alarming rate due to foreign currency problems, lack of market, and unfavourable executions on public procurement laws and regulations.

In the process of this research, it is noted that imported re-bar is observed to be significant by volume and value, which is according to some findings reached at 46% of total demand. This very large amount was supplied by traders who imported finished re-bar products from foreign sources (MCI, 2017, p. 9). Thus, it is a practical fact that the Ethiopian re-bar market potential is not able to be properly exploited by the local re-bar manufacturers, requiring immediate policy intervention to facilitate the market for local producers. This, of course needs further exploration. As it was found through the study, the government should take the lead in resolving the under-capacity production problem of the industries, of course with consultation and the direct involvement of the manufacturers themselves.

In line with this, the problem of the re-bar manufacturers, as far as it is to be resolved with hard currency priority, seems to be a manageable task for the government, which could achieve this by shifting the access of hard currency from the importation of the finished re-bar products to the importation of raw material (Samuel, 2017), and creating a reliable market for the industries. Together, these measures would pave the way for local manufacturers to enhance their capacity to the highest possible level. This in turn, will create a positive multidimensional impact on the progress of national industrialization at large, according to the feedback and comments of those knowledgeable people in the sector whom the researcher approached for discussion.

Therefore, there must be taken appropriate measures to curb the situation with appropriate actors through identifying the possible major causes for the underutilization in accordance with their seriousness level.

5.3. Recommendations

Based on the above research findings and conclusion the following recommendations are forwarded to the attention of re-bar manufacturing companies, the Ministry of Industry, and the Metal Industry Development Institute.

Accordingly, the industrial association, and the industries themselves are supposed to take significant part to improve situation.

5.3.1. Ministry of Industry (MoI)

As the MoI is the umbrella in formulating and executing policy matters for industrial development issues, a lot of responsibilities are there to be carried out by same. Among many, the following is recommended:

5.3.1.1. Supplier credit facility or any other foreign source must be well assessed in a regular manner for the benefit of the metal sector,

5.3.1.2. The metal and engineering sector is the mother of all industries. Therefore, the government should have a clear and exclusive policy document for the metal sector that supports foreign currency availability, banning of finished re-bar importation, sufficient and timely raw material supply, and workable public procurement practices, rules and regulations in favour of local manufacturers, so that the re-bar manufacturing industries can be more competitive on the international and national markets.

5.3.2. The Re-bar manufacturing industries

The re-bar manufacturing industries are the final operators that bring forth the potential to be realized. Therefore, organized data that supports the endeavours in enhancing the industrial capacity utilization is expected to be collected and organized in a regular manner by the industries, including:

The supply chain management must be improved to forecast the potential threat and opportunities in the raw material purchase, earning of foreign exchange, and finally international market of finished products,

5.3.2.1. Improve leadership capacity of the industries to engage themselves regularly market consultation with the association, MIDI and other concerned authorities, establish relationships with similar international manufacturing industries.

5.3.2.2. Employ highly skilled technical & managerial personnel.

5.3.3. The Association

Ethiopian Association of Basic Metals and Engineering Industries (EABME) is a national sector association comprising about 70 manufacturers. It has a big role in enhancing the capacity utilization of the manufacturers' through various research and experience sharing activities. Among many practical interventions expected from the association, the notable ones are pointed out here:

5.3.3.1 Improve/establish networking and experience sharing with international industries,

5.3.3.2 The Association requires improving its service excellence by reviewing its current institutional competence along with roles & responsibilities.

5.3.3.3 Establish business network with technology oriented intervention to solve skilled manpower problem.

5.3.3.4 The Association must conduct a regular research study on policy improvement, marketing, international business, etc to improve the overall industrial market competitiveness.

5.3.4. Future research

Identifying the major causes for the under-capacity production problem of Ethiopian re-bar manufacturers may serve as basis for further research. Hence, the researcher recommends the following research areas for future:

5.3.4.1. How government can enhance the industrialization process by developing local metal and engineering industries through product by product support?

5.3.4.2. How a bulk purchasing system for key raw material and inputs for metal industries may be established to make use of economy of scale?

5.3.4.3. Analysis of the Ethiopian re-bar industry at the overall Ethiopian Economy

5.3.4.4. Supply chain analysis for the Ethiopian re-bar manufacturing industry

5.3.4.5. How foreign currency allocation must be managed to develop the metal sector of Ethiopia?

5.3.4.6. How public procurement and property disposal service may foster metal and engineering sector?

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Appendix-1: Survey Questions

ADDIS ABABA SCIENCE AND TECHNOLOGY UNIVERSITY

Causes and possible solutions for Under-capacity production of Re-bar Manufacturing Industries in Ethiopia

Dear respondents,

The purpose of this research is to identify the major cause and possible solutions for the under-capacity production volume of some re-bar manufacturing industries in Ethiopia as requirements for the completion of Master's Degree in Industrial management at Addis Ababa Science and Technology University.

Your voluntary participation and accurately responding survey questions has an added value to the successful completion of this research. Your response will be used for academic purpose only and will be kept confidential.

Thank you for your cooperation,

Solomon Mulugeta Yigletu

Tel: 0937-88 89 81

E-mail: ruhegeso@yahoo.com

Instructions: Check one of the followings in the space provided.

1. Demographic Characteristics of respondents

1.1 Age:

☐ 20-25 ☐ 30-35 ☐ ≥ 40

☐ 25-30 ☐ 35-39

1.2 Sex:

☐ Male ☐ Female

1.3 Education:

☐ Diploma ☐ Master's degree

☐ Bachelor degree ☐ PhD

2. Which one of the following best describes your **organization**?

☐ Private re-bar manufacturing industry

☐ Sectorial Association of metal and engineering industries

☐ Metal industry development institute

☐ Other_____

3. What is your **major role** in the organization?

☐ General Manager/Director General/President

☐ Manager/Director for Technology/Production/Engineering/ department

☐ Manager/Director for Marketing/Commercial/Supplies department

☐ Professional Expert

☐ Other_____

4. There is a **serious under-capacity utilization problem** in the Ethiopian re-bar manufacturing industries.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

The following questions aim to identify barriers and challenges that might be taken as the **possible causes** for the under-capacity utilization of re-bar producers in Ethiopia, if you agree on the question 3 above.

No	I believe that the following item is the major cause for the under-capacity utilization of re-bar manufacturing industries	Strongly Agree	Agree	Disagree	Strongly Disagree	Neutral
5.	Shortage of Electric Power					
6.	Lack of foreign currency					
7.	Lack of working capital					
8.	Lack of market					
9.	Lack of proper management and leadership					
10.	Lack of appropriate skilled manpower					
11.	Unfair competition with imported products					
12.	Monopolistic nature of competition among local manufacturers					
13.	Reluctance of public procurement offices to buy from local manufacturers					

The following questions aim to identify the **main stakeholders that must give solutions** for the under-capacity utilization of re-bar producers in Ethiopia.

14. The government is the major stakeholders that should take the prime responsibility to alleviate the under-capacity utilization problems of the re-bar manufacturing industries.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

15. The Metal Industries Development Institute is the major stakeholders that should take the prime responsibility to alleviate the under-capacity utilization problems of the re-bar manufacturing industries.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

16. The re-bar manufacturing industries is the major stakeholders that should take the prime responsibility to alleviate the under-capacity utilization problems of the re-bar manufacturing industries.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

17. The Ethiopian Association of Metal and Engineering industry is the major stakeholders that should take the prime responsibility to alleviate the under-capacity utilization problems of the re-bar manufacturing industries.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

18. Universities and Research Institutes is the major stakeholders that should take the prime responsibility to alleviate the under-capacity utilization problems of the re-bar manufacturing industries.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

The following questions aim to identify the **possible remedies** for the under-capacity utilization of re-bar producers in Ethiopia.

No	I believe that the following item is the possible remedies for the under-capacity utilization of re-bar producers in Ethiopia.	Strongly Agree	Agree	Disagree	Strongly Disagree	Neutral
19.	Banning imported finished re-bar products					
20.	Adjusting public practices, rules, and regulations of the gov't procurement service to the favor of local Re-bar manufacturers					
21.	Allow Suppliers credit facility for industries					
22.	Developing an iron ore mining project					
23.	Giving priority for re-bar manufacturing companies Hard currency priority					
24.	Intervention of the government in availing raw material through bulk procurement from abroad					
25.	Banning the privilege for investor of importing re-bar duty free privilege					

26. Which one is the priority challenge, if it is properly resolved by the governmental intervention that all other problems of the industries may be take care of themselves?(Check all that apply)

- ☐ Power cutoff
- ☐ Foreign currency

- Public procurement
- Imported finished product influence
- Working capital
- Management and leadership
- Skilled manpower
- Raw material
- Other:_____

_____

_____

Appendix-2: Focus group discussion points

With Re-bar managers of Re-bar manufacturing industries(C and E Brothers, Steely R.M.I, Habesh Steel, Abysinia Steel), MIDI management staff, EABMEI management staff.

1. What are the major causes for the under-capacity production of re-bar industries In Ethiopia?

2. What are the possible solutions for the under-capacity utilization challenges?

3. Which stakeholder must take the lead in resolving the challenge, and why?

Appendix-3: Interview Questions

With re-bar managers of re-bar manufacturing industries(C and E Brothers, Steely R.M.I, Habesh Steel, Abysinia Steel), MIDI management staff, EABMEI management staff.

1. What are the major causes for the under-capacity production of re-bar industries In Ethiopia?
2. How the Public procurement and Property disposal service is affect the market of local re-bar industries?
3. What is the role of the government and other stack holders must be to resolve the challenge together?

4. What are the possible solutions for the under-capacity utilization challenges?

5. Which stakeholder must take the lead in resolving the challenge, and why?

Appendix-4: Company Profiles

Steely R.M.I

Institute's focal person: Zeritu Agegnehu **Tele:** 011 6293447

Industry Name: Steely R.M.I

Region and Specific Place: Addis Ababa, Kality Head office and Debrezieth Plant

Telephone: 011 439 42 95/011 439 55 48

Fax: 0114391147

Ownership: Ethiopian

Owner Name: Ato Mesfin and

General Manager Name: Ato Tefera **Tele:** 011 439 42 95

Establishment Year: in 1997E.C

Focal Person of the Industry: Ato Kassaye **Tele:** 011 439 55 48

Starting Capital: 140,000,000birr

Current Capital: 320,000,000birr

Product Type

No	Product Type	Production Installed Capacity Ton/ Year	Raw Material	Raw Material HS-Code
1	Reinforcement Bar		Scrap, Billet and Ingot	
2	Wire rod			
Total		270,000		

Steely-2016-Man power Status

Classification	No of employees											
	2nd degree		1st degree		Diploma/TVET		Certificate		Other		Total	
	M	F	M	F	M	F	M	F	M	F	M	F
Manager	5		6		2						13	0
Engineer											0	0
Technician/Operator			2		102	2	30	2	446	23	580	27
Daily Labor									155	21	155	21
Other Supportive staff (Admin, Finance, sales, audit…)			10		17	9	5		12	145	44	154
	5	0	18	0	121	11	35	2	613	189	792	202

C and E Brothres

1- **Institute's focal person**: Eng. Dilachew Wagesho Tel :0928416934 **e-mail** : dilachew2015@yahoo.com
2- **Profile prepared on** : 25/07/07E.C
3- **Industry's name**: C and E Brothers Steel Factory.
4- **Address**: Debrezeit, behind pyramid hotel on the way to Bishoftu Automotive ,Kebele 01.
5- **Type of products**: Re-bar.
6- **Ownership** : Local
7- **Industry's land ownership**: Private **Area:**
8- **Name of the owner/owners**: Mekuanet Alemu **Tel**: 0930069994 **e-mail:**
9- **General Manager's name**: Wendiferaw Belete **Tel**: 0930069994 **e-mail**:- candesteel@gmail.com
10- **Focal person's name**: Yoseph Mulugeta position: Production and Technical Manager Tel: 0930349763 e-mail:
11- **Initial capital** : 105,000,000br. **Current capital**:- 206,000,000br.
12- **Year of establishment**: 2003E.C
13- **No. of employees when start:-** 400

C and E-Current Man power

S/N	CLASIFICATION	Currently available												Future required
		3rd degree (PHD)		2nd degree (Masters)		1st Degree		Diploma/ TVET		Certificate		Others		
		M	F	M	F	M	F	M	F	M	F	M	F	
1	Manager			3										
2	Engineer					1								
3	Technician/Operator					12	5	26	7					
4	Daily Labor											290	50	
5	Other Supportive staff									25	3	20	10	
Total				3		13	5	26	7	25	3	310	60	

Appendix-5: Regulation No 182/2010 on establishment of Metal Industry Development Institute

(Attached in the next pages)